CHAPTER I
NATURAL FAT
BATCH ATMOSPHERIC (BATCH ([1])

I. Description of the system

Critical control points

1. Crushing time _____minutes

   Absolute time _____minutes

   Temperature _____°

2. Cooking

3. Separation Testing for Clostridium perfringens

4. Meal production

5. Storage
   Testing for Salmonella and enterobacteriaceae

6. Distribution

Where necessary, the material is reduced in size by crushing. It is then heated in a steam-jacketed vessel (often with a steam-heated rotor) to remove the inherent moisture. The moisture is driven off as water vapour at atmospheric pressure. After drying cooking, the material is then separated into its liquid/tallow and protein-greaves fractions, either by mechanical means or by use of solvent, before being made into animal protein meals.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Absolute time: the batch should be processed for a minimum of___minutes at the minimum temperature shown in paragraph 3 below.

3. The critical temperature: this should operate above the minimum temperature of___°C. The temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

_____

([1]) Trade name in brackets.

CHAPTER II
NATURAL FAT
BATCH (BATCH/PRESSURE ([1])

I. Description of the system

Critical control points

Particle size ___ mm
Absolute time ___ minutues
Temperature ___ °C
Pressure profile ___ pascal (Bar)

1. Crushing and/or pressure disintegration

Size
Cooking time _____ minutes
Absolute time _____ minutes
Temperature_____°

2. Cooking

3. Separation Testing for Clostridium perfringens

4. Meal production

5. Storage

Testing for Salmonella and enterobacteriaceae

6. Distribution

Where necessary, the material is reduced in size by crushing. The material is then, directly or after predrying, heated in a totally enclosed vessel, after driving off atmpospheric air, until the required pressure and temperature are achieved. This state is held by adjustments to the heating and/or exhaust systems for the prescribed time, after which the pressure is lowered at a controlled rate, back to atmospheric pressure. The material is then dried to remove all of its inherent moisture, either in the same vessel or in another of the described systems to produce a product that can then be split into its liquid/tallow and protein/greaves fractions, normally by mechanical means, before being made into animal protein meals.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater

than...mm, are found, repairs should be made.

2. Absolute time: the batch should be processed for a minimum of___minutes at the minimum temperature shown in paragraph 4 below.

3. Presssure profile: the material should be subjected to a minumum___Pascal (Bar) for a minimum of ___ minutes. These parameters should be recorded for each batch processed.

4. The critical temperature: this should operate above the minimum temperature of___°C. The temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

_____

([1]) Trade name in brackets.

CHAPTER III
NATURAL FAT
CONTINUOUS ATMOSPHERIC (STORD([1])

I. Description of the system

Critical control points

Particle size ___ mm

1. Crushing Feed rate ___ tpt

   Temperature minimum ___°C

2. Cooking

3. Separation Testing for Clostridium perfringens

4. Meal production

5. Storage

   Testing for Salmonella and enterobacteriaceae

6. Distribution

Where necessary, the raw material is reduced in size. The material then passes into a steam-heated vessel where the inherent moisture is driven off as water vapour at atmospheric pressure. Progress of the material through the vessel is controlled by means of displacement and mechanical restrictions to ensure that the final product, when discharged from the cooking/drying operation, has achieved the necessary time and temperature. After drying/cooking the material is separated into its liquid/tallow and protein/greaves fractions, normally by mechanical means, before being made into animal protein meals.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Raw material feed rate: this should operate within the range of ___ and ___ tonnes per time unit(tpt). The maximum feed rate should be ___ tonnes per time unit. During the start-up and shut-down procedures careful attention should be given to the other critical control points, in paragraph 3 below.

3. The critical temperature: this should operate above the minimum temperature of___°C. The

temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

_____

([1]) Trade name in brackets.

CHAPTER IV

ADDED FAT

CONTINUOUS ATMOSPHERIC (STORK DUKE([1]))

I. Description of the system

Critical control points

Particle size ___ mm

1. Crushing

   Fat Recyling Feed rate ____ tpt

   Fat recyling rate ___ litres/second

   Temperature minimum ___°C

2. Cooking

3. Separation Testing for Clostridium perfringens

4. Meal production

5. Storage

   Testing for Salmonella and enterobacteriaceae

6. Distribution

Where necessary, the material is reduced in size. The raw material passes into a steam-heated vessel where a constant level of hot liquid fat/tallow is maintained. This principle of deep-fat frying takes place with the passage of the raw material through the vessel and is controlled by means of displacement and mechanical restrictions to ensure that the cooked/dried material is discharged with all of its residual moisture removed at atmospheric pressure as water vapour. On discharge, any surplus fat not required to maintain the cooker-drier working level is removed, normally by draining and mechanical means and the solid fraction protein/greaves is made into animal protein meals.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Raw material feed rate: this should operate within the range of ___ and ___ tonnes per time unit(tpt). The maximum feed rate should be ___ tonnes per time unit. During the start-up and shut-down procedures careful attention should be given to the other critical control points, in paragraph 4 below.

3. Fat recycling rate: fat should be recycled up to a maximum rate of ___ litres/second and should be recorded hourly.

4. The critical temperature: this should operate above the minimum temperature of___°C. The temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

_____

([1]) Trade name in brackets.

CHAPTER V
ADDED FAT
CONTINUOUS VACUUM (CARVER-GREENFIELD([1])

I. Description of the system

Critical control points

Particle size ___ mm

1. Crushing

   Fat Recyling Feed rate ____ tpt
   Fat recyling rate ___ litres/second
   Temperature minimum ___°C

2. Stage 1

3. Stage 2
   Testing for Clostridium perfringens

4. Separation

5. Meal production
   Testing for Salmonella and enterobacteriaceae

6. Storage

7. Distribution

In this system the raw material, after crushing, is normally ground or minced with hot liquid fat, to produce a tallow slurry which can then be pumped through a series of steam-heated tubular heat-exchanges with vacuum chambers, where the inherent moisture is flashed off in the form of water vapour. This process is continually recylcing with a controlled bleed-off system of raw material between stages to ensure the discharged product from the cooking/drying system has had all of its inherent moisture removed. The product is then separated, normally by centrifugal means, into its liquid/tallow and protein/greaves fractions. The liquid fat is recycled back to the start of the system and the solids, protein/greaves made into animal protein meals.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Raw material feed rate: this should operate within the range of ___ and ___ tonnes per time unit(tpt). The maximum feed rate should be ___ tonnes per time unit. During the start-up and shut-down procedures careful attention should be given to the other critical control points, in paragraph 4 below.

3. Fat recycling rate: fat should be recycled up to a maximum rate of ___ litres/second and should be recorded hourly.

4. The critical temperature: this should operate above the minimum temperature of___°C. The temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

([1]) Trade name in brackets.

CHAPTER VI
ADDED FAT
CONTINUOUS VACUUM (MODIFIED CARVER-GREENFIELD([1]))

I. Description of the system

Critical control points

Particle size ___ mm

1. Crushing

Fat Recyling Feed rate ____ tpt

Fat recyling rate ___ litres/second

Temperature minimum ___ °C

2. Stage 1

3. Stage 2
Testing for Clostridium perfringens

4. Separation

5. Meal production
Testing for Salmonella and enterobacteriaceae

6. Storage

7. Distribution

In this system the raw material, after crushing, is normally ground or minced with hot liquid fat, to produce a tallow slurry which can then be pumped through a series of steam-heated tubular heat-exchanges with vacuum chambers, where the inherent moisture is flashed off in the form of water vapour. This process is continually recylcing with a controlled bleed-off system of raw material between stages to ensure the discharged product from the cooking/drying system has had all of its inherent moisture removed. The product is then separated, normally by centrifugal means, into its liquid/tallow and protein/greaves fractions. The liquid fat is recycled back to the start of the system and the solids, protein/greaves made into animal protein meals.

([1]) Trade name in brackets.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Raw material feed rate: this should operate within the range of ___ and ___ tonnes per time unit(tpt). The maximum feed rate should be ___ tonnes per time unit. During the start-up and shut-down procedures careful attention should be given to the other critical control points, in paragraph 5 below.

3. Fat recycling rate: fat should be recycled up to a maximum rate of ___ litres/second and should be recorded hourly.

4. Presssure profile: the material should be subjected to a minumum___Pascal (Bar) for a minimum of ___ minutes. These parameters should be recorded for each batch processed.

5. The critical temperature: this should operate above the minimum temperature of___°C. The temperature should be recorded on a permanent recording system for batch. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

CHAPTER VII

DE-FATTED

CONTINUOUS ATMOSPHERIC

(STORD/ATLAS/ALPHA LAVAL([1]))

I. Description of the system

Critical control points

Particle size ___ mm

1. Crushing
2. Pre-heating
3. Pressing
4. Separation

   Feed rate ____ tpt
   Temperature minimum ___ °C

5. Evaporator

   Temperature minimum ____ °C

6. Sterilizer
7. Storage
8. Distribution
9. Drying

   Testing for Clostridium perfringens

10. Meal production
11. Storage

    Testing for Salmonella and enterobacteriaceae

12. Distribution

Where necessary the raw material is reduced in size. It is then heated to a temperature at which coagulation of the material takes place. Then, by mechanical forces (normally by pressing), the inherent liquid phases of fat and water are removed from the solids. The solids then pass to a drying/cooking system, to remove inherent moisture and produce a solid fraction of protein/greaves which are made into animal protein meals. The liquid phase is further treated to separate and recover the fat/tallow by centrifuging. The water phase is normally evaporated before final drying.

II. Critical control points for individual plants

1. Particle size: there should be a nominal anvil gap of___mm. The final size-reduction equipment should be checked daily and its condition recorded. If anvil gaps of greater than...mm, are found, repairs should be made.

2. Raw material feed rate: this should operate within the range of ___ and ___ tonnes per time unit(tpt). The maximum feed rate should be ___ tonnes per time unit. During the start-up and shut-down procedures careful attention should be given to the other critical control points, in paragraph 4 below.

4. The critical temperature:

   (a) for meal this should operate above the minimum temperature ___ °C;

   (b) for fat this should operate above the minimum temperature ___ °C.

The temperature should be recorded continually on a permanent recording system. Any product produced at a temperature lower than the minimum temperature should be re-processed with raw material.

([1]) Trade name in brackets.